

Highly Efficient Micro Cathode, Phase I

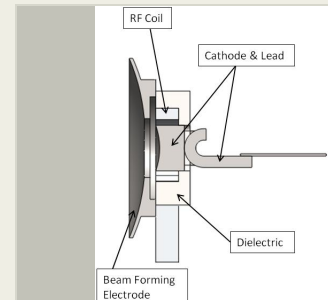
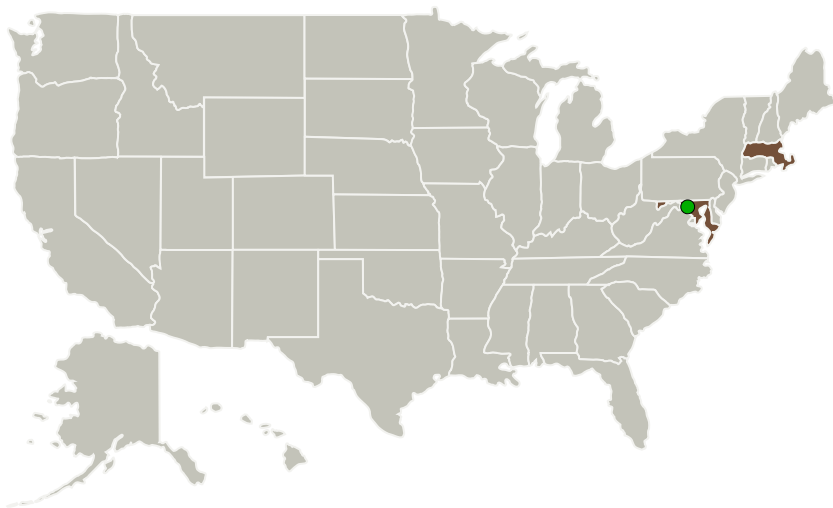
Completed Technology Project (2013 - 2013)



Project Introduction

Busek Company, Inc. proposes to develop a micro thermionic cathode that requires extremely low power and provides long lifetime. The basis for the cathode is a Barium impregnated dispenser cathode. The innovation will be the heating technique. We are proposing to heat the cathode to emission temperatures through radio frequency induction heating. The current state of the art micro cathodes utilize a resistive heater typically operated by passing a DC or AC current through a small refractory wire, heating the wire through ohmic heating. This requires significant sized wires and mechanics that create a heat sink through the leads, greatly increasing the power required to heat the cathode. Alternative development programs for micro cathodes have proposed utilizing lasers to heat the backside of the cathode. The drawback for this method of heating is the low power efficiency of state of the art lasers. In support of our proposed concept, Busek has recently developed an innovative RF generation circuitry that leads to applications like the proposed. The circuit is highly efficient and load variant tolerant. During Phase I we will design, build and test a model cathode with integrated induction heater coil and RF generator. Phase II will optimize the design and develop a commercial cathode for applications such as sensors, traveling wave tubes or micro ion engines.

Primary U.S. Work Locations and Key Partners



Highly Efficient Micro Cathode

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Organizations Performing Work	Role	Type	Location
Busek Company, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Natick, Massachusetts
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland	Massachusetts
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Project Transitions

**May 2013:** Project Start**November 2013:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138591>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Busek Company, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

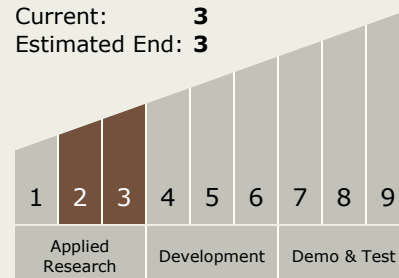
Kurt Hohman

Technology Maturity (TRL)

Start: 2

Current: 3

Estimated End: 3

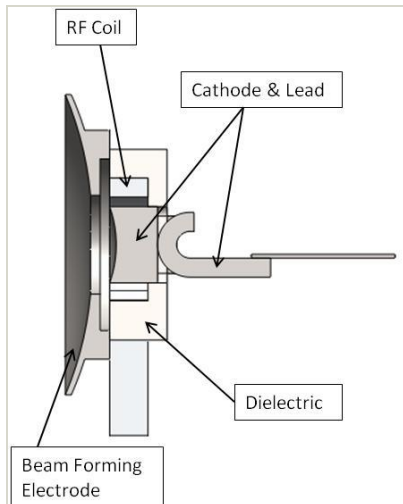


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Images



Project Image

Highly Efficient Micro Cathode
(<https://techport.nasa.gov/image/126610>)

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.1 Avionics Component Technologies
 - └ TX02.1.5 High Performance Field Programmable Gate Arrays

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System